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Smart Glasses With Wireless Charging

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ABSTRACT

This disclosure describes an inductive wireless charging system for smart glasses that places a charging coil on smart glasses and utilizes the carrying case of the smart glasses for wireless charging. Per techniques of this disclosure, the carrying case includes ferrite sheets provided on its walls. A receiver winding is provided along the rim of the smart glasses. The winding can include Litz wires or flexible printed circuits (FPC) embedded into the rim. Ferrite sheets of the carrying case are utilized as both RX and TX ferrite sheets. A larger ferrite sheet additionally provides better magnetic performance and enables greater power transmission capacity.

KEYWORDS

- Augmented reality (AR)
- Virtual reality (VR)
- Smart goggles
- Smart glasses
- Ferrite sheet
- Charging pad
- Charging case
- Carrying case
- Wireless charging

BACKGROUND

Smart glasses such as Augmented Reality (AR) and Virtual Reality (VR) headsets, etc. typically include batteries that are charged wirelessly. Many such wearable devices include a wireless charging system that utilizes a receiver (RX) coil that is located on one of the temple arms of the glasses. The relatively small dimension of the temple arm, e.g., with a width of 12 mm or less, poses constraints on feasible RX coil sizes, and thereby limits received power capacity. Since the transmitter (TX) coil size (on the charger) is based on the RX coil size, a

small RX coil size also leads to a smaller transmitter (TX) coil, and lower power transmission capacity. Additionally, in order to mitigate the impact of the magnetic field generated during charging, portions of the temple arm need to be manufactured from non-metallic material, which affects the heat dissipation performance of the temple arm.

DESCRIPTION

This disclosure describes a wireless charging system for smart glasses that utilizes the carrying case of the smart glasses for wireless charging, e.g., wireless inductive charging using the Qi standard for wireless power transfer. The carrying case is configured as a charging case and includes ferrite sheets provided on the walls of the carrying case.

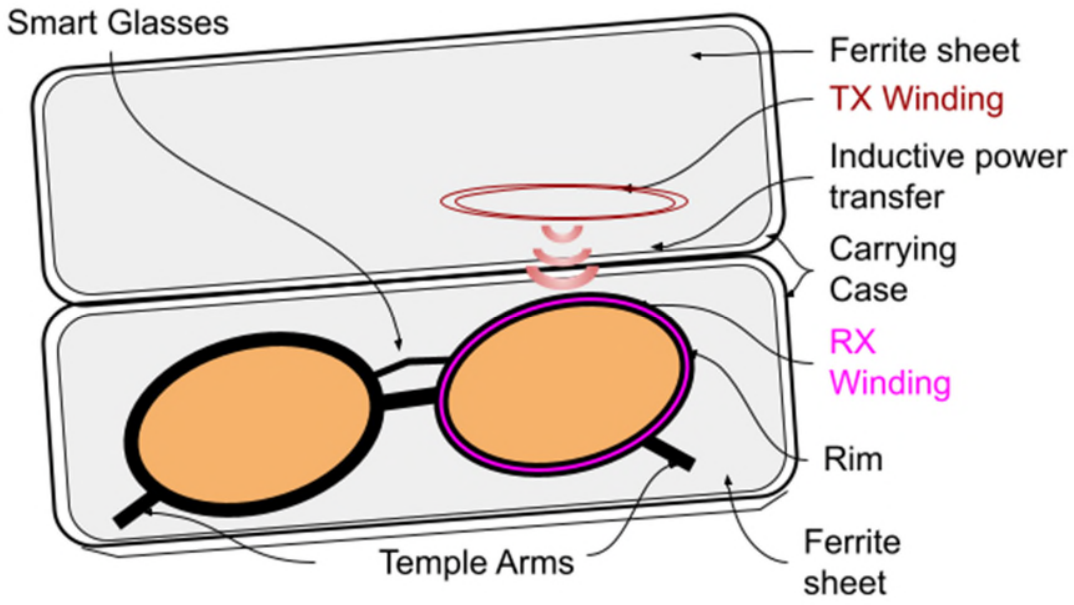

Fig. 1: Receiver (RX) winding is located on a rim of the smart glasses

Fig. 1 depicts an example wireless charging system for smart glasses, per techniques of this disclosure. A receiver winding (RX) is provided along a rim of the smart glasses. The winding can include Litz wires or flexible printed circuits (FPC) embedded into the rim. In some

designs, the rim of just one of the lenses can be utilized to house the receiver winding. A transmit winding (TX) is located on the charging wall where it is aligned with the RX winding while the charging case is closed.

In some implementations, a transmit winding (TX) is located within the carrying case and aligned with the receiver winding that is located on the rim of one or both of the lenses. The TX winding on the charging case can be arranged such that the magnetic field generated by the TX winding is spatially contained within the charging case, and envelopes a space defined by the carrying case. When the smart glasses are placed inside the carrying case, the smart glasses are charged via the RX located on the rim.

Ferrite sheets are provided along the walls of the carrying case that are utilized for both transmit and receive functions. Providing a RX ferrite sheet in the carrying case (rather than on the glasses) can eliminate the need to provide space for the RX ferrite sheet on the smart glasses, where the available space is limited. A larger ferrite sheet provides better magnetic performance. Additionally, a larger RX ferrite sheet enables a relaxation in the design constraints on TX size, and provides greater power transmission capacity.

In some implementations, the wireless charging system can function in conjunction with an external wireless charging pad. In such implementations, the lower side of the carrying case bottom is made of non-metallic/non-magnetic material, while the RX winding is located on the frame (e.g., rim) of the smart glasses and the carrying case cover is utilized as the RX ferrite sheet. When the carrying case is placed on a charging pad which serves as the power transmitter, the battery of the smart glasses is charged from power received via the RX ferrite sheet located in the carrying case and the RX winding located on the frame of the smart glasses.

CONCLUSION

This disclosure describes an inductive wireless charging system for smart glasses that places a charging coil on smart glasses and utilizes the carrying case of the smart glasses for wireless charging. Per techniques of this disclosure, the carrying case includes ferrite sheets provided on its walls. A receiver winding is provided along the rim of the smart glasses. The winding can include Litz wires or flexible printed circuits (FPC) embedded into the rim. Ferrite sheets of the carrying case are utilized as both RX and TX ferrite sheets. A larger ferrite sheet additionally provides better magnetic performance and enables greater power transmission capacity.